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A MULTIVARIATE ANALYSIS OF REENLISTMENT INTENTIONS AS A PREDICTOR OF REENLISTMENT BEHAVIOR

by

Anne-marie Rearden

December 1988

Thesis Advisor: Loren M. Solnick

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A Multivariate Analysis of Reenlistment Intentions as a Predictor of Reenlistment Behavior

by

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Lieutenant, United States Navy
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Submitted in partial fulfillment of the
requirements for the degree of

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ABSTRACT

The purpose of this thesis is to determine whether reenlistment intentions can help to predict actual reenlistment behavior. The sample consists of 6,328 Navy male enlisted members who are within one year of the reenlistment decision. The thesis constructs multivariate models consisting of numerous predictor variables. The variables are divided into three categories: demographic, reenlistment intentions, and job satisfaction variables. Results show that the most powerful predictor of reenlistment behavior is the reenlistment intentions variable. The results also show that reenlistment behavior is influenced by race, age, pay grade, marital status, enlistment period, and level of satisfaction with the military in general. The study also estimates a model to show the relationship between the demographic and job satisfaction variables and reenlistment intentions. This model demonstrates that some demographic and job satisfaction variables indirectly influence reenlistment behavior through their impact on reenlistment intentions. Understanding the importance of intentions to reenlist during the one-year period prior to reenlistment can assist career counselors in their efforts to increase reenlistment rates.

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I. INTRODUCTION

The desire to accurately predict human behavior has always been an important priority in the fields of psychology, economics, and statistical analysis. The capability of understanding human behavior is a powerful tool. This tool proves very useful to large organizations/companies who rely on the feedback from employees in order to improve manpower policies. Just like these companies, the United States Navy relies on information obtained from its current enlistees in order to understand what factors cause these individuals to remain in or depart from the service.

The challenge of maintaining a highly trained, high-caliber enlisted force has long been considered to be one of the major topics of interest among military and civilian manpower planners. Manpower shortages have remained a major concern for the Navy; the ability to retain the maximum number of members possible is the ever-present goal of the military. After spending thousands of dollars training these individuals, it proves to be very cost-effective to retain the members for as long as possible. In addition to saving money, retaining trained individuals also increases the level of expertise in the naval forces, thus allowing the Navy to operate at or near peak efficiency. However, there are numerous economic, personal, and job satisfaction variables that may cause an individual to decide to leave the service upon the

completion of his existing contract. Reenlistment behavior is an important topic to the Navy and is one that receives much attention.

Trying to project the probability that an individual member will depart the service upon completion of his or her existing contract is difficult and is not always accurate. The task can be made easier by sampling a representative portion of the Navy through the use of a survey based on intentions. Members usually have a definite opinion of the military and whether they would like to reenlist, and a majority of them will decide well in advance of the termination of their existing contract whether or not they wish to reenlist.

An econometric model based on intentions appears to be an accurate measure of individual behavior, but the results of the model can be improved upon by the use of actual behavior information. Did the member reenlist or did he leave the service? Does his actual behavior match that of his intentions? The validation of a model designed to predict reenlistment intentions occurs when follow-on data is used to compare the intentions of the member with his actual behavior.

The purpose of this thesis is to develop an econometric model predicting naval male enlisted reenlistment behavior and then to test the validity of the model by its ability to predict reenlistment behavior via intentions using actual retention behavior. The data set used in this analysis is the *1985 Department of Defense Survey of Officer and Enlisted Personnel.* For the purpose of this study, the reference group consists of Navy enlisted males. Also used is an addendum to the 1985 survey which consists of the actual retention information of the

members participating in the survey. This study will concentrate on actual reenlistment behavior immediately following the survey and up to the third quarter of fiscal year 1987. [Ref. 1]

The overall objectives of this study are twofold: First, an accurate model will be constructed using significant predictor variables to gauge the likelihood of reenlistment of an individual. The second issue to be addressed is whether a member's intention is a good predictor of actual behavior. This will prove useful to military manpower planners in that trends can be established early on, so that severe losses of personnel due to attrition can be anticipated and career counselors can take advantage of any surge in desire to remain in the Navy.

Another advantage to using the follow-on data is that it will also lend increased validity to the model used to predict the desire to reenlist or leave the service. A model containing independent variables that correctly predict actual reenlistment behavior is invaluable to military manpower planners. Such variables could include anything from monetary factors (pay, benefits, bonuses) to economic factors (ability to find a civilian job, state of the economy) to personal feelings (satisfaction with job, overall satisfaction, family comfort).

The next chapter of this thesis will review previous research conducted in this area, including the weaknesses of these studies. Chapter III will present the method of analysis used in this study and the rationale for the choice of methodology. Also included is a list of variables and their expected results when intention data is compared with actual behavior. Significant variables will be noted and the theoretical

background of these variables will be reviewed. Chapter IV consists of the results of the model and a discussion of the implications of the analysis. In order to correlate intentions with actual behavior, a comparison should be made between the computed predicted number of reenlistees and the actual number of reenlistees obtained from the subsequent data. Chapter V deals with the conclusions of the analysis and makes recommendations for follow-on work.

II. LITERATURE REVIEW

A. STUDIES ON FACTORS AFFECTING RETENTION

Numerous studies have analyzed the factors affecting an individual's decision to remain with or to leave a particular organization. In the military context, existing studies mainly attack the reenlistment dilemma by attempting to predict the probability of an individual's reenlisting in the service based on a key set of variables. The chosen variables that are statistically significant are then said to be the factors that most influence a member's decision to remain in the armed forces. These studies are helpful when constructing a model to predict reenlistment behavior. The first section in this chapter focuses on civilian and military studies and the significant factors that were found to effect retention. The reenlistment probability model in Chapter III was created based on these observations.

The primary problem observed in many of the studies conducted on predicted enlisted retention is one of analysis technique. Various forms of statistical analysis are used—regression analysis, factor analysis, discriminant analysis, and principal components analysis are just a few of these. However, regression analysis appears to be the superior method of statistical surgery because it is mathematically accurate and more than just "a few quick calculations."

Another difficulty encountered with previous studies is that few exist relating military reenlistment intentions with actual behavior. A

majority of these discuss the factors affecting retention; they occasionally mention intentions affected by key variables but do not statistically relate them to the predicted behavior.

Few studies relate intentions to actual behavior that are specifically military-oriented. Citing civilian work is possible, and these studies may also relate to the services; however, variables unique to the armed forces change the scenario slightly. While an employee in the civilian sector may opt to depart his place of employment whenever he chooses, this is not the case for a military member. Another factor that is usually not parallel in the two environments is pay. Military personnel receive the same pay no matter how long or hard they work; on the other hand, most civilian employees receive overtime pay for additional hours of work beyond the usual number of hours worked. Attempting to rely on civilian studies might not be totally accurate when analyzing intention and behavior patterns; nonetheless, these studies do provide a necessary backdrop for this study.

1. Previous Studies of Civilian Work Behavior

Various studies have been conducted on the similarities of the intentions of individuals to quit and their actual behavior. The question arises as to whether intent is a casual variable that affects all other variables leading to an individual's decision to remain on the job or to quit. Attempting to capture a person's intentions that reflect his aggregate feelings about his job is difficult. When surveys are conducted, the individual may be answering the "intent to remain on the

job" question with a recent incident in mind—one that might skew his otherwise neutral opinion of his level of satisfaction. Despite the possible existence of this type of bias, studies have revealed similar findings; apparently, the day-to-day occurrences at work do not noticeably affect the survey results.

According to a study completed by Mobley, Horner, and Hollingsworth [Ref. 2], employees' intentions to remain on the job or to quit do affect their actual behavior. Further analysis shows that job satisfaction affects intentions to quit and intentions to search for a new job—both of these intentions then affect the individual's actual behavior. This conclusion supports the idea that intent is a direct factor when deciding to leave an organization. This analysis encompasses two areas of interest; it analyzes the factors that are most likely to affect turnover and it regresses intentions to leave the organization against actual turnover data. Due to the latter, this study will be analyzed in greater detail in the next section.

Similarly, a study conducted by Arnold and Feldman [Ref. 3] approaches the question of intention and actual behavior by analyzing the factors that cause employees to remain with a company. Analysis of factors such as perceived job security, intentions to look for other work, perceived existence of other work, and intentions to change job positions demonstrated that these variables did influence turnover behavior. As with the Mobley, et al. study, Arnold and Feldman also compared intention information with actual turnover behavior. Because

of this important link, this study will also be analyzed in the next section.

2. Military Studies Conducted

Few studies have been conducted that compare intentions of military members to reenlist with actual reenlistment behavior. Not until recent years has data been available in a format such that the comparison could be made.

A Naval Postgraduate School thesis by Albiso and Buscher [Ref. 4] discussed the variables affecting attrition. This study deals with attrition and not retention; the reason it is mentioned here is that variables in the Albiso, et al. attrition model parallel those used in this study's models. The data for the Albiso and Buscher study were obtained from the Defense Manpower Data Center (DMDC), specifically from the Reserve Components Common Personnel Data System (RCCPDS) database for 1980 through 1982. A model was created with the dependent variable being defined as a loss which occurs before completion of the committed term of enlistment [Ref. 4:p. 47]. Regression analysis conducted on a sample of 13,627 first-term members revealed that the most significant variables affecting attrition were an individual's race, age, whether he was a high-school graduate, and his current pay grade. A member who was other than black, older, a high-school graduate, and who had more than one tour in the service had a greater tendency to remain in the service to the end of his contract than an individual who did not fall in these categories. [Ref. 4:p. 50]

A study on reenlistment behavior analyzed by Hand, Griffeth, and Mobley [Ref. 5] concludes that training opportunities, job security, travel opportunities, advancement opportunities, pay, and benefits were factors that caused individuals to remain in the military. Factors influencing those who chose not to reenlist included separation from family members, long work hours, and poor leadership. All of these variables seem to surface throughout the numerous analyses of the predictability of enlisted retention.

One interesting factor guiding the behavior of an individual when deciding on whether to reenlist is the parents' level of education. Findings by Greenberg and McConeghty [Ref. 6] reveal that a member's father's education level is an excellent predictor for the member's reenlistment behavior. Their analysis focuses on the need for understanding the motivating factors behind reenlistment decisions. To facilitate the data collection, personal interviews were conducted with eight different groups of recruits and active-duty members—the number of individuals in each group is not mentioned in the study. A structured questionnaire was then used that asked questions about demographics, previous experience, and attitudes about the military. To quantify the data, Greenberg and McConeghty conducted stepwise multiple regression analysis in addition to summarizing the survey results by performing a cross-tabulation of the key variables. Variables found to be significant were age (younger versus older tended to leave), race (blacks versus whites tended to leave), and education level. Concerning education, the threshold values are

not delineated by the author; however, it is assumed that the cut-off year is immediately upon graduating from high school. Also significant was the likelihood of finding a good civilian job and family financial status, where members who were happy with the family's financial status tended to remain in the service. One interesting observation that contradicts other studies and what is hypothesized in the next chapter concerns marital status. Greenberg, et al. found that a married sailor had a greater tendency to leave the service than a single member. He attributes this to the fact that family opposition to a member who is at sea for many months is very great.

Another intriguing analysis in the Greenberg and McConeghty study is one involving the reenlistment decision itself. They believe that potential nonreenlistees are much more likely to enlist impulsively. Most do not give more than a month of forethought to their decision [Ref. 6:p. 217]. Greenberg and McConeghty provide no analytical support for this observation; in fact, based on previous shipboard experience, this author believes this to be false. A large majority of individuals seem to do the majority of their reenlistment decision making beginning approximately one year to six months prior to the reenlistment time period.

Finally, Greenberg, et al. bring up the point that as of the completion of his study, there were no accurate data banks containing information on those who remained in the service and those who departed the service. This thesis broaches this topic by comparing intention and survey information with actual behavior data.

Using the *1985 Department of Defense Survey of Officer and Enlisted Personnel* and the *1986 Reserve Components Survey*, and based on a sample of 511 prior-service first-term Army Reserve males, Thomas and Davis show that race, age, marital status, number of dependents, and the parents' level of education (most specifically the mother's) were significant factors concerning a member's reenlistment intentions [Ref. 7]. Also shown in this initial research is the importance of parents' income. An individual whose parents earn a larger amount of money tends to be more likely to reenlist. Thomas and Davis used a Logit model to analyze the data, with 78.6 percent of the responses being correctly classified.

A recent analysis of intention and behavior relationships by Treadway [Ref. 8] shows that an individual's marital status, race, and belief that he can obtain a good civilian job upon departure from the service will cause him to decide whether to intend to leave or to remain in the service. The two demographic variables—marital status and race—are considered significant in this study, which parallels previous works. The variable that considers a member's belief that he can obtain a good civilian job upon departure from the service may be considered to be an intention-oriented variable. If a member believes that his chances of getting a good civilian job are great, then his intentions to leave the service will be greater. The data used in this study was extracted from the *1985 Department of Defense Survey of Officer and Enlisted Personnel*. The sample consisted of 640 first-term enlistees, and the dependent variable was based on an individual's intentions to

remain in the service for 20 years or more. The model used in this analysis was a binary-choice Logit model. The model shows that if the intentions data are an accurate guide to reenlistments, then 70.4 percent of the reenlistment decisions are predicted accurately.

A study by Marsh [Ref. 9] also uses the *1985 DOD Survey* to examine enlisted and officer retention intentions. The data set consists of Navy personnel with little time in service and senior personnel with many years in the Navy. Marsh emphasizes the factors that affect reenlistment intention, but he does not reference or use the follow-on data available through the Defense Manpower Data Center (DMDC). The dependent variable used in the model is the individual's likelihood of reenlisting at the end of the current term of service. Ordinary Least Squares (OLS) multiple regressions are used to analyze the data. The independent variables were segregated into three categories: family, expectations, and duty history. The following factors were found to significantly affect an individual's reenlistment intentions: time on active duty, expected paygrade upon departure from the service, likelihood of finding a good civilian job upon departure from the service, and overall satisfaction of military life in general.

Also concerned with the analysis of factors affecting retention is the work conducted by Allen [Ref. 10]. In his study, subjects were selected at random from a designated Army infantry division; approximately ten percent of the division was chosen. Questions were asked of these members in the following categories: personal and demographic, military status (i.e., pay grade), organizational (i.e., job

satisfaction), and expressed career intentions. The data was analyzed in two separate sections—officers and enlisted. Regression analysis was conducted in two forms—hierarchical and stepwise, where specified predictors were regressed against career intentions. Variables found to be statistically significant when considering the reenlistment decision were years in service (more service time meant staying in), age (older versus younger tended to remain), level of job satisfaction (higher job satisfaction indicated staying in), education level (the more educated tended to leave), and race (black versus white tended to stay). These observations are consistent with other studies and the hypothesized results of this thesis.

Three studies that deal with reenlistment and the factors affecting retention focus on the Selective Reenlistment Bonus (SRB) program. These studies do not use the survey data and thus cannot include many of the factors considered here. The SRB was created to encourage the potential reenlistee to remain in the service. Studies by Warner [Ref. 11], Cymrot [Ref. 12], and Warner and Goldberg [Ref. 13] have shown that SRB levels do affect retention rates and attrition behavior. Unfortunately, the *1985 DOD Survey* does not include any questions about SRB amounts, satisfaction with these amounts, or considerations given to SRBs by a potential reenlistee. Because of this lack of information, this study will not include analysis of SRBs in Chapters III and IV. However, because of the importance of the bonuses, three studies which support the existence of the Selective Reenlistment Bonus system will be discussed.

A study by Warner [Ref. 11] analyzes the factors that cause attrition among Navy personnel and the factors that affect first-term reenlistments. Warner states that despite differences in data and methodology among manpower researchers, one consistency is that a combination of increased pay and SRB money causes a member to reenlist after his first term [Ref. 11:p. 17]. An advantage of SRBs over other pay incentives is that they are more flexible because they can be paid at career points where retention is a problem [Ref. 11:p. 39]. Warner does believe that bonuses have been not been used to their fullest potential, especially prior to FY 1981. In 1981, bonus funds were significantly increased and helped reduce the number of nonreenlistees.

A study by Cymrot [Ref. 12] looks at the Marine Corps enlisted bonus program. In this study, 66 skill groups, including 22 skill families and three experience zones, are analyzed for SRB effects. A skill family is defined as a group of military occupational specialties (MOS), and an experience zone is defined as a range of years of service. The analysis reviews experience zones from zero to 14 years of service, when a Marine is eligible for reenlistment bonuses. Cymrot found that as benefits, specifically SRBs, increased, so did reenlistment rates [Ref. 12:p. 2]. The model used to analyze the relationship between SRB and reenlistment is the Annualized Cost of Leaving (ACOL) approach. In this model, the amount of SRB for an individual is determined by the equation SRB = MBP * YREN * $MULT_{ij}$, where MBP = monthly base

pay, YREN = years of reenlistment, and $MULT_{ij}$ = bonus multiple for MOS "i" in experience zone "j." [Ref. 12:p. 4]

The data used for Cymrot's analysis came from the ARStat file grouped by quarters from fiscal year 1980 to the end of the calendar year 1985 [Ref. 12:p. 10]. The data was analyzed using a multivariate approach. In the ACOL approach, the individual decides whether to remain in the military based on the discounted value of the perceived costs and benefits of the alternatives [Ref. 12:p. 24]. The model assumes that the individual will pick the alternative that leads to maximum satisfaction.

The results of the analysis indicate that SRBs directly affect a majority of the skill families, particularly those in the personnel and administration field, truck drivers, engineers and mechanics, and communication specialists [Ref. 12:p. 40]. Predicted reenlistment rates for those in personnel and administration (Zone A—junior personnel) fluctuated from 30.0 percent for a zero bonus multiple to 89.3 percent for a bonus multiple of six. Those in the infantry had a 12.6 percent reenlistment rate for a zero bonus multiple, while those with a bonus multiple of six had a 42.9 percent chance of reenlisting. Obviously, the higher the SRB, the greater the chance a member will reenlist.

A third study involving the SRB program is by Warner and Goldberg [Ref. 13] and deals with the non-pecuniary factors affecting the Navy enlisted labor supply. The model in this analysis is based on an individual who is at the end of his first term of enlistment. Factors

that are hypothesized to affect the reenlistment decision are the present value of income and the present value of the monetary equivalent of non-pecuniary benefits [Ref. 13:p. 27]. The data set used in the Warner and Goldberg study consists of 220,606 Navy enlisted personnel classified into 16 occupational areas.

When analyzing the compensation system, Warner, et al. state that the only significant variable element of the system is the SRB. The authors review the various bonus multiples used to determine the size of the SRB based on occupational specialty. [Ref. 13:p. 29] By using the ACOL model, probit analysis, and calculated effects of a one-level SRB increase on the reenlistment rate, Warner and Goldberg determined the potential increase in reenlistments. The results show that the SRB program and the bonus multiple system are definitely effective: On the average, each one-level SRB increase will generate 3.2 additional reenlistments per 100 persons eligible to reenlist. [Ref. 13:p. 33]

B. STUDIES OF INTENTIONS AS A PREDICTOR OF RETENTION

The studies described above only assist in explaining factors that affect reenlistment and retention behavior. None of them analyzes the effects that intentions have on retention behavior. However, a few studies analyze factors affecting retention and whether intentions affect reenlistment behavior.

As mentioned in the previous section, a study completed by Mobley, Horner, and Hollingsworth [Ref. 2] was revolutionary in the fact that a quantitative analysis was made of the relationship between employee intentions and other factors and actual turnover data. Based

on their results, Mobley, et al. concluded that employees' intentions to remain on the job or to quit do affect their actual behavior.

The study was conducted on a group of hospital employees—203 members responded to the survey with a 90 percent participation rate. Variables analyzed included those concerning job satisfaction, intention to quit, demographic characteristics, and perceived probability of finding another job. The hypothesis that intention to quit is a function of intention to search, probability of finding another job, and dissatisfaction was tested and the following result was obtained: Quit intentions are most directly related to the intention to search for another job and the age factor.

Expanding this model even further, intention and demographic data were considered the independent variables while actual behavior data acted as the dependent variable. The turnover data was obtained by following up on the status of the members participating in the survey for a period of 47 weeks immediately following the survey. The turnover data consisted of those employees who voluntarily and involuntarily left the company. Based on this information, 10.3 percent of the turnovers were found to be voluntary, and intentions had a great effect on the turnover decision. This conclusion supports the idea that intent is a direct factor when deciding to leave an organization.

Similarly, a study conducted by Arnold and Feldman [Ref. 3] approaches the question of intention and actual behavior by analyzing the factors that cause employees to remain with a company. In

addition, they obtained actual behavior data and regressed the significant variables against the behavior information.

The subjects for the Arnold and Feldman study were members of the Canadian Chartered Accountants organization; there were 1,058 respondents who were interviewed and surveyed with a 45 percent response rate. Turnover data was collected for up to one year immediately following the survey. The final sample size without any missing data was 654. The models were analyzed using hierarchical multiple regression analysis—two models were used, one containing demographic and satisfaction type variables and one containing the same variables *and* intention variables. In both models, actual behavior data was the dependent variable. Based on this information, the following results were obtained: the older an individual, the more likely he was to remain with the organization; the more tenure an individual had, the more likely he would remain with the company; the higher one's job satisfaction, the more likely one would not leave an organization; and the higher the job security an individual felt, the less likely he was to turn over.

The model constructed without the intention variables found that tenure, job satisfaction, job security, and organizational commitment most significantly affected the turnover behavior, while the model that included the intention variables found that tenure, job satisfaction, and job security were the only significant factors. No support was found for the hypothesis that perceived existence of alternative jobs has an

effect on intentions to remain with an organization, which is contrary to the Greenberg, et al. study.

Arnold and Feldman do point out a potential problem with their data set. Because all of the respondents are professional accountants, there is a chance that their behavior is a reflection of economic factors. It is mentioned that there is a great demand for accountants; thus the turnover percentages reflect economic conditions as well as intentions. Also cited is the fact that those responding to the interviews and survey are from the same geographical area, which could also introduce a bias into the analysis. Fortunately for the purposes of this study, bias due to geographic location will not come into play. Every rating of Navy enlisted personnel is sampled as well as those from all over the United States. Economic factors would have a significant effect, as they did in the Arnold and Feldman study, but due to the construction of the *1985 DOD Survey*, economic variables were not measured.

A final analysis that deals with the link between intentions and actual behavior is a Westinghouse Public Applied Systems-Follow-on Study conducted by personnel at the Westinghouse research facilities [Ref. 14]. This endeavor sampled military members using a survey similar to the *1985 DOD Survey* and the results of the survey were paired up with the subsequent behavior data via social security number. The original sample was to be limited to those military members who were married and who had at least one primary dependent. It also intended to focus on those in pay grades E4 through E6 because they

were at a critical point in their Navy careers. They were not too old to start a civilian career, yet they had enough experience in the Navy to make a reasonable decision [Ref. 14:p. 19]. However, after inputting the information, it was decided to include those from E1 through E9. The majority of the sample ended up being from the E4-E6 category, so that the original intent of looking primarily at E4-E6 was preserved. The final factor to limit the sample size was to only analyze those at a critical reenlistment decision point. The authors do not identify the time frame considered to be within the critical reenlistment decision window.

Following these considerations, the data set consisted of 3,802 personnel, who were predominantly male and white. Because of the fact that blacks were underrepresented by 50 percent, the authors warn that the reader should interpret the enlisted results with caution [Ref. 14:p. 20]. The instrument for the analysis was a 326-item survey administered to the sample group. Items in the survey were classified as follows: demographic characteristics, family considerations, housing, transportation, job/work conditions, financial information, satisfaction with Navy life, and those factors associated with the retention decision. In order to ascertain retention behavior of the individuals in the study, the authors used the Enlisted Personnel System Tracking File maintained by Naval Military Personnel Command (NMPC) [Ref. 14:p. 22].

Three primary methods of analysis were used: covariate analysis of factors, path analysis, and discriminant analysis. The covariate analysis

of factors consisted of computations made with 45 variables on the independent side of the equation and with enlisted retention behavior on the dependent side. Based on this method, the following variables were found to be significant at the 95 percent level of confidence: family income (the more satisfied a member was with family income, the more likely he was to remain in the Navy), satisfaction with the Navy job (the more satisfied a member was with his job, the more likely he was to remain in the Navy), and civilian job opportunity (the greater the chance the individual felt he had to obtain a good civilian job, the greater the chance he would not leave the service). Other factors that had an effect on intentions and behavior were family separation due to deployments and frequency of moves. Also found to be very powerful was years of service; however, the authors' rationale for its explanatory power is unusual—they feel that it is due to the spouse's opinion of the Navy. Their hypothesis is that the longer a member is in the service, the better the spouse's attitude will be about the military. This author disagrees with this point based on experience. Military members who have spouses who do not agree that they should remain in the service tend to obtain divorces; thus, spouse opinion might not influence the reenlistment decision as much as the Westinghouse study indicates.

A second method used is path analysis. This methodology consists of the computation of a series of regression equations where the dependent variable is a given variable and the independent variables are logically or theoretically proven variables [Ref. 14:p. 81]. The

primary purpose of path analysis is to quantify the configuration of a set of hypotheses that deal with a designated phenomenon. Following along with this idea, the authors state that the best predictor of retention behavior is intention to reenlist. This thesis is intended to further test this idea. The results of the path analysis revealed that opinion of the spouse was the most powerful factor influencing a member's decision to reenlist. A spouse's opinion was influenced by services provided for and used by the family, satisfaction or dissatisfaction due to deployment separations, and years of Navy service. The second-most influential factor was satisfaction with Navy and family life. Satisfaction was, in turn, affected by the age of dependents, the level of social support from co-workers and job supervisors, satisfaction with Navy services provided to the family, total family income, and marital satisfaction. The third variable important to the reenlistment decision is satisfaction with the Navy job. This variable was influenced by years of Navy service, pay grade, social support from co-workers, and satisfaction with pay and allowances. The final variable considered to significantly affect the member's decision to reenlist is years of service in the Navy. As stated by the author, the longer the member has been in the service, the more likely he is to remain in the service.

Discriminant analysis was the third method of analysis used in this study. It attempts to estimate a linear combination of variables and to then use them to calculate the probability of membership within a group; this was the construction of the first model. The study used the

same variables as those in the path analysis. A second discriminant function was set up that included retention intentions as a variable to check the degree to which intentions increased the accuracy of the prediction. The findings reveal that the intention variable is a very powerful one; the model that included intentions enhanced the predictive quality of the model. Because of the difference in the two models shown in the Westinghouse study, this author will also analyze the data in the same manner. The non-intentions model predicted reenlistment behavior accurately 66 percent of the time, whereas the intentions model predicted reenlistment behavior 73 percent of the time. The major points made in this study were that it is possible to predict retention behavior based on a limited number of factors, and intentions do accurately predict retention behavior. [Ref. 14:p. 103]

III. METHOD OF ANALYSIS

A. RESEARCH OBJECTIVES

The objectives of this thesis are twofold. First, the thesis intends to construct a model that analyzes the relationship between identified factors that affect reenlistment decision-making and actual reenlistment behavior. This objective will be achieved using the recommended variables from the studies explained in Chapter II. The second objective of this thesis provides for an improved measure of estimating reenlistment behavior—this objective is to determine whether an individual's intentions to reenlist accurately predict his reenlistment decision. The model in this study differs from most other models in that the dependent variable in this model is actual reenlistment behavior data obtained immediately following the survey through the third quarter of fiscal year 1987. The intentions variable has been relocated from the dependent side of the model to the independent side; thus, stated reenlistment intentions are used to analyze actual behavior.

B. DATA SET USED

The data set for this thesis was obtained from the *1985 Department of Defense Survey of Officer and Enlisted Personnel.* The survey was conducted around the world and queried all active-duty members of the armed forces. The sample design for enlisted members was stratified by service, time in service, and sex. When considering only

Navy male enlisted members, the sample size (prior to any data cleaning) was 16,986. The overall enlisted response rate for the survey was 70.1 percent, which is an unusually high rate of response for a survey of this size. Even more surprising is the response rate for Navy male enlisted—81.6 percent. [Ref. 1:p. 2-9]

The survey that generated this data set was administered in nine sections: Military Information, Present and Past Locations, Reenlistment/Career Intent, Individual and Family Characteristics, Military Compensation, Benefits and Programs, Civilian Labor Force Experience, Family Resources, and Military Life.

The follow-on data to the survey consists of a file merged into the 1985 DOD Survey file; this file is updated on a quarterly basis and displays the status of the individual who participated in the survey. Status includes that of active duty, left the military and did not join the reserves, left the military and joined the reserves, and retired. The two files are matched by social security number so that the current status of the member responding to the survey may be matched with his responses. This comparison serves to identify whether intentions of an individual to remain in or to leave the service predict actual behavior.

In order to provide for a more accurate model, certain deletions were made. Any questions that were not answered (usually assigned a value of -1) were deleted as well as those where the response to the questions was "not applicable" or "don't know." To further narrow down the type of respondents, only those members with less than 12

months remaining in their current enlistment were considered. This time remaining includes any extensions effective as of the survey. This is important to the accurate analysis of intentions as a predictor of behavior; an individual who is very close to the reenlistment decision time frame has a much better idea of the factors to consider when making that reenlistment decision. Those individuals who stated that they were planning to retire at the end of their current enlistment were also deleted. These members, if left in the sample, would create a bias toward higher retention; there is not a true decision to be made by members who are due to retire within one year. This parallels the deletion of those members who posted as "retired" in the follow-up data set.

C. DEVELOPMENT OF THE MODEL

Three versions of the model discussed in this thesis used actual behavior data as the dependent variable. These models were constructed as follows: The first model considered only demographic variables on the independent side. The second model considered demographic variables and the intentions variable. The third model considered demographic factors, intentions, and satisfaction-type variables. The models were constructed for the purpose of regression analysis via the Logit method. Two additional models were created to analyze the career intentions variable as a continuous independent variable (using Logit) and as a continuous dependent variable (using Ordinary Least Squares). The latter of the two assists in explaining how demographic and satisfaction factors influence intentions. The

following section discusses the advantages of multivariate data analysis, specifically focusing on the superiority of the Logit method of analysis over the linear probability model.

D. MULTIVARIATE DATA ANALYSIS

The technique known as "multivariate data analysis" is one of the most statistically sound methods of analyzing an individual's behavior. According to Studenmund, this approach is superior because it specifies the models or relationships to be studied, collects the data needed to quantify the models, and quantifies the models with estimates obtained from the data. The use of regression analysis to analyze the data allows a set of independent variables to predict the actions of a dependent variable. This procedure can test whether a significant quantitative relationship exists between the independent and dependent variables. [Ref. 15:pp. 4-5]

1. Linear Probability Model

The linear probability model is an effective method of analyzing the relationships between multiple independent variables (in this case, factors that affect retention) and the dependent variable (actual reenlistment behavior). This model shows the probability that a member will reenlist, based on the given independent variables—for example, job satisfaction, pay, and age. When using this model for prediction purposes, specifically, a "yes" or "no" decision (i.e., the binary choice of 0 or 1), a major weakness is noted: The possibility exists that the predicted value may lie outside of the (0,1) range [Ref. 16:p. 377]. The only way to correct this problem is to limit the extreme

predictions to the (0,1) choice; however, this limitation causes "...the predictions obtained from the estimation process to be clearly biased." [Ref. 16:p. 377] To avoid the problem of bias, the author chose to use the Logit method to accurately analyze the effect that intentions to reenlist have on actual reenlistment behavior.

2. Logit Analysis

The concept of logit analysis is based on the logistic cumulative probability distribution. The logit model is defined as

$$P_i = F(\alpha + \beta X_i) = F(Z_i) = 1/1+e^{-Z}$$

where F is a cumulative logistic probability function [Ref. 16:p. 280]. The Xs are explanatory variables and the βs are parameters to be estimated. The advantage to this method over the linear probability model is that it constrains the model to be within the (0,1) range. Further explained, the constant "ß" measures the impact of a change in "X" on the log of the odds of a particular event occurring because the model can also be written as $\log(P/(1-P)) = \alpha + \beta X_i$. Another advantage of Logit over the Linear Probability Model is that it tends to minimize the effects of heteroscedasticity. [Ref. 16:p. 292] The parameters are estimated by the maximum likelihood method.

E. VARIABLE DESCRIPTION

Based on previous studies and the author's actual experience obtained while assigned to a naval vessel, the following variables are considered to be key factors in the reenlistment decision-making process: race, age at time of survey, marital status at time of survey, number of dependents, level of parents' education (the greater of the

mother or father), member's level of education, years in service, enlistment period at time of survey, intentions to reenlist, possibility of finding a good civilian job upon departure from the Navy, total satisfaction with military life in general, and satisfaction with total family income. The dependent variable is taken from actual behavior data obtained after the administration of the survey and up to the third quarter of 1987. These variables are discussed in the subsequent paragraphs.

1. Actual Status of Member Following the Survey (YESNAV)

This variable takes into account the actual military status of the members who responded to the survey. By matching the status data with the member's survey responses, accurate regression analysis can be obtained. A binary choice situation was set up for the dependent variable—only those members who either left active duty or remained on active duty were considered. Those who left active duty were able to respond in two ways: left active duty and did not join the reserves, and left active duty and joined the reserves. For the purposes of this study, both categories were combined.

2. Race (WHITE)

When grouping individuals in a binary choice situation, the reference group tends to be whites versus non-whites. The reference group in this case consists of American Indian, Black, Oriental, and Other. Studies reveal that the reference group has a greater tendency than its counterpart to reenlist. This hypothesis is expected to hold for this analysis, but these results might be influenced by other factors

related to race—level of education, parents' education, and parental income. These characteristics tend to be similar for different races.

3. Age (At Time of Survey—CURTAGE)

Many studies show that a recruit who is older than the average recruit of 20 years has a greater tendency to remain in the service [Ref. 17]. Two reasons are offered to explain this behavior: First, an older individual tends to have a clearer picture of his goals and aspirations. Second, a member who joins at an early age might not have enough experience to realize whether the military is the place to be. More experienced personnel have usually accomplished a variety of tasks and jobs and have a better idea of what type of work suits them. In this analysis, age remains a continuous variable.

4. Current Marital Status (MARSTAT)

Other results from Naval Postgraduate School studies using the *1985 DOD Survey* reveal that married individuals have a greater tendency to remain in the service [Refs. 8, 18]. This hypothesis is expected to be further supported by the results of this study. The primary explanation for this behavior is that a married member feels an increased responsibility to maintain steady employment in order to provide for his family. On the other hand, a single member has fewer responsibilities and is expected to change jobs on a more frequent basis. In this case, the "married" status consists of "married—first time" and "remarried." The reference group consists of "single—never married," "separated," "divorced," and "widowed."

5. Number of Dependents (DEPS)

The rationale for this variable is parallel to that of marital status at time of entry. An increased number of dependents is expected to increase an individual's level of responsibility, thereby causing him to remain in the service. This variable was divided into two categories—those with no dependents and those with at least one dependent.

6. Parents' Education (FAMED)

A study by Thomas and Davis indicates that the more educated the parents of a military member, the lower the likelihood that the individual will reenlist [Ref. 7]. Because of differing results in previous studies, the greater of the member's father's education level and mother's education level is used. The break point for this variable is the parent who had more than a high-school degree. Results from this study are expected to parallel those of Thomas and Davis.

7. Highest Grade of Education (HSGRAD and SOMECOL)

Various studies support the hypothesis that a more educated member will tend to reenlist over one with less education [Ref. 17:p. 8]. Individuals tend to obtain schooling for "the long-term benefits it provides." These benefits are partly in the form of higher earnings, "...gaining access to more interesting, challenging, or pleasant jobs, and...in the form of prestige or enhanced enjoyment of nonmarket activities." [Ref. 19:p. 293] For the purposes of this study, the education variable was divided into three sections: those with less than a high-school education (the reference group), those with a high-school

education (HSGRAD), and those with more than a high-school education (SOMECOL). It is expected that there will not be a significant difference between those with just a high-school degree and those with some college experience.

8. Pay Grade (At Time of Survey—JUNIOR and CHIEF)

An individual who has a greater amount of time in the service is more likely to remain in the military. This behavior is fully supported in a theoretical sense and by historical data. After investing an increased number of years in one organization, most individuals feel that it is cost-effective to remain with the same organization. This is mainly because the military pay system is a time payment system—the more years in the service, the higher the pay will be. "Because of the anxiety about less-productive periods of time (in an incentive-pay scheme), employees might prefer the certainty of time-based pay...." [Ref. 19:p. 409] In order to facilitate increased explanatory power among the various pay grades, the variable was divided into two categories: JUNIOR, being those who are E4 and below, and CHIEF, being those who are E7 and above. Pay grades E5 through E6 is used as the reference group.

9. Reenlistment Period (At Time of Survey—FRSTERM and SNDTERM)

In order to see the varying effects that intentions may have on those in different reenlistment periods, two dummy variables were created. The reference group is those individuals who are on their third or greater reenlistment. Of particular interest are those facing

the first reenlistment decision. It is at this point where a majority of the Navy members leave the service. FRSTERM concentrates on this group of individuals, while SNDTERM views those serving on their second reenlistment contract.

10. Likelihood of Reenlisting

This variable is important for the purposes of this study because it indicates intent to remain in the service. Those who indicate a "probable" or better response for likelihood of reenlistment appear to be the ones who definitely reenlist. Based on civilian studies reviewed in the Chapter II, the response to this question directly relates to the probability of an individual remaining in the service or departing the service. The intentions variable is analyzed in three different manners: The first version uses a series of 10 dummy variables to categorize the degree of certainty of reenlistment, with a reference group of "no chance" of reenlistment. These categories are

- Very Slight Possibility– VSLITPOS
- Slight Possibility– SLITPOS
- Some Possibility– SOMEPOS
- Fair Possibility– FAIRPOS
- Fairly Good Possibility– FGOODPOS
- Good Possibility– GOODPOS
- Probable– PROBABLE
- Very Probable– VPROB
- Almost Sure– ALMSURE
- Certain– CERTAIN

The second version treats intentions as a continuous independent variable. This is added to the analysis to compare the accuracy of this model with the model using the 10 dummy variables.

The third version places intentions as a continuous variable on the dependent side of the equation. This relationship shows the effects that the demographic and satisfaction-type variables have on intentions.

11. Likelihood of Finding a Good Civilian Job (CIVJOB)

It is expected that when a member feels as though he has a better-than-average chance of securing a "good" civilian job, he will have a greater tendency to leave the service. Studies using the *1985 DOD Survey* show that this variable significantly affects an individual's decision whether to reenlist. For the purposes of this analysis, when a member responded to the question, "If you were to leave the service now and tried to find a civilian job, how likely would you be to find a good civilian job?" with an answer of "fairly good possibility" or better, it was considered to be an indication of sufficient confidence at finding a civilian job.

12. Total Job Satisfaction (TOTLSAT)

Based on analyses conducted by two Naval Postgraduate School students, the greater the overall job satisfaction of a military member, the greater the chance he will remain in the service [Refs. 8, 18]. This variable in the *1985 DOD Survey* was significant for officer as well as enlisted personnel. In this study, a dummy variable was created where satisfaction with the military as a way of life was considered to

be acceptable if the member answered "somewhat satisfied" or better to the survey question.

13. Satisfaction with Family Income (FAMINC)

In today's two-income society, this variable is expected to be significant when explaining reenlistment behavior. It is expected that a member who is not happy with total family income will seek other employment. However, there is a possibility that this variable is related to the "marital status" and "number of dependents" variables; if this is so, and the above conjectures on the two variables are correct, then the satisfaction of family income would not be significant. The military member would not be willing to seek out new employment at the risk of creating an unstable financial environment for the family.

IV. ANALYZING THE RESULTS

Interpreting the results from regression models enables the reader to fully understand the effect that the particular variable has on a member's decision to reenlist or not to reenlist. Numerous models are used to analyze this behavior, for intentions have a major effect on the reenlistment decision. To fully comprehend the power of the intentions variable, five models were estimated. The first consists of only demographic characteristics, the second contains demographic and intention variables, and the third consists of demographic, intention, and satisfaction-type variables. The fourth model treats the intentions variable as a continuous independent variable, unlike the other models which group intentions according to degree of intention likelihood. The fifth model analyzes intentions as a continuous dependent variable. The purpose of this model is to understand the effect that the demographic and satisfaction-type variables have on intentions.

After deleting missing or irrelevant observations, the final sample consisted of 6,328 Navy male enlisted personnel who had one year or less remaining on their current enlistment. This number was selected from the original sample of 16,986. Men who were facing retirement or who did not meet the time to reenlistment criteria were deleted from the original sample.

A. CROSS TAB, FREQUENCY, AND CORRELATION RESULTS

Table 1 indicates the frequency of those who reenlisted based on their intention to reenlist. Note that the percentage of those who reenlisted steadily increases up the scale from 19.7 percent for the value of "1" for INT (which can be interpreted as the response "very slight possibility") to 91.6 percent for a value of "10" (where INT indicates "certain" to the question of "How likely are you to reenlist at the end of your current term of service?")

Table 2 reveals the frequency for each variable evaluated in all the models. The variable indicating actual status is divided into three groups; because this thesis is only concerned with those on active duty and those who left active duty, the responses of "left active duty—joined reserves" and "left active duty—did not join reserves" are combined. The following observations are made concerning the frequency distributions of the variables:

- The largest splits in pay grade occur between the E3 and E4 level and again between the E6 and E7 level.
- A majority of the personnel are in their first enlistment period.
- Those with less than one year remaining on their current contract are evenly spread out throughout the months.
- The largest number of members state that they will either definitely leave the service or definitely remain.
- A majority of the personnel have at least a high-school degree.
- A majority of military members are between the ages of 21 and 39.
- The largest race is white, with black in second place. It is the author's belief that the large number of "other" responses is due to the proportionately large Filipino population.

TABLE 1

CROSS TABULATION

TABLE OF PERCENT REENLISTED (YESNAV)
BY INTENTIONS

YESNAV*	Intentions**											
Freq Percent Row % Col %	0	1	2	3	4	5	6	7	8	9	10	
0	1948	68	62	75	56	69	55	44	44	64	148	2633
	31.44	1.10	1.00	1.21	0.90	1.11	0.89	0.71	0.71	1.03	2.39	42.50
	73.98	2.58	2.35	2.85	2.13	2.62	2.09	1.67	1.67	2.43	5.62	
	80.30	55.28	52.99	43.10	35.22	32.39	21.91	20.18	17.25	12.96	8.39	
1	478	55	55	99	103	144	196	174	211	430	1617	3562
	7.72	0.89	0.89	1.60	1.66	2.32	3.16	2.81	3.41	6.94	26.10	57.50
	13.42	1.54	1.54	2.78	2.89	4.04	5.50	4.88	5.92	12.07	45.40	
	19.70	44.72	47.01	56.90	64.78	67.61	78.09	79.82	82.75	87.04	91.61	
TOTAL	2426	123	117	174	159	213	251	218	255	494	1765	6195
	39.16	1.99	1.89	2.81	2.57	3.44	4.05	3.52	4.12	7.97	28.49	100.00

*YESNAV	INTERPRETATION
0	Member left active duty
1	Member remained on active duty

**INTENTION	INTERPRETATION (possibility of remaining in the service)
0	No chance
1	Very slight possibility
2	Slight possibility
3	Some possibility
4	Fair possibility
5	Fairly good possibility
6	Good possibility
7	Probable
8	Very probable
9	Almost sure
10	Certain

- A vast majority of the mothers and fathers of members completed at least 12 years of schooling.
- A majority of the sample is married for the first time, with the second largest group being those who have never been married.
- Most of the members have no dependents or one or two dependents.
- Most members feel that they have an excellent chance of getting a good civilian job upon departure from the Navy. This response, however, is only an indication of the member's *perceived* chance.
- A majority of the sample indicates that they are neither satisfied nor dissatisfied with their total family income.
- A majority of the individuals indicated that they are either "somewhat satisfied" or "satisfied" with the military way of life.

TABLE 2

FREQUENCIES

FY87 MEMBER STATUS

STATUS	VERBAL INTERPRETATION	FREQ	%	CUMUL FREQ	CUMUL PERCENT
1	REMAINED ACTIVE DUTY	3614	57.1	3614	57.1
2	LEFT ACT DTY-JOINED RESERVES	1677	26.5	5291	83.6
3	LEFT ACT DTY-DID NOT JOIN RES	1037	16.4	6328	100.0

PAY GRADE

STATUS	VERBAL INTERPRETATION	FREQ	%	CUMUL FREQ	CUMUL PERCENT
1	E1	29	0.5	29	0.5
2	E2	56	0.9	85	1.3
3	E3	545	8.6	630	10.0
4	E4	1801	28.5	2431	38.4
5	E5	1857	29.3	4288	67.8
6	E6	1282	20.3	5570	88.0
7	E7	577	9.1	6147	97.1
8	E8	130	2.1	6277	99.2
9	E9	51	0.8	6328	100.0

TABLE 2 (Continued)

FREQUENCIES

ENLISTMENT PERIOD

STATUS	VERBAL INTERPRETATION	FREQ	%	CUMUL FREQ	CUMUL PERCENT
1	FIRST ENLISTMENT PERIOD	2693	42.6	2693	42.6
2	SECOND ENLISTMENT PERIOD	1871	29.6	4564	72.1
3	THIRD ENLISTMENT PERIOD	1072	16.9	5636	89.1
4	FOURTH ENLISTMENT PERIOD	502	7.9	6138	97.0
5	FIFTH ENLISTMENT PERIOD	190	3.0	6328	100.0

TIME REMAINING

STATUS	VERBAL INTERPRETATION	FREQ	%	CUMUL FREQ	CUMUL PERCENT
1	LESS THAN 3 MONTHS	1180	18.6	1180	18.6
2	3 TO UNDER 6 MONTHS	1546	24.4	2726	43.1
3	6 TO UNDER 9 MONTHS	1741	27.5	4467	70.6
4	9 TO UNDER 12 MONTHS	1861	29.4	6328	100.0

LIKELIHOOD OF REENLISTING

STATUS	VERBAL INTERPRETATION	FREQ	%	CUMUL FREQ	CUMUL PERCENT
0	PLAN TO LEAVE THE SERVICE	2350	37.1	2350	37.1
1	NO CHANCE	136	2.1	2486	39.3
2	VERY SLIGHT POSSIBILITY	128	2.0	2614	41.3
3	SLIGHT POSSIBILITY	119	1.9	2733	43.2
4	SOME POSSIBILITY	179	2.8	2912	46.0
5	FAIR POSSIBILITY	161	2.5	3073	52.0
6	FAIRLY GOOD POSSIBILITY	219	3.5	3292	56.1
7	GOOD POSSIBILITY	258	4.1	3550	59.6
8	PROBABLE	223	3.5	3773	63.7
9	VERY PROBABLE	259	4.1	4032	63.7
10	ALMOST SURE	501	7.9	4533	71.6
11	CERTAIN	1795	28.4	6328	100.0

TABLE 2 (Continued)

FREQUENCIES

CURRENT EDUCATION

STATUS	VERBAL INTERPRETATION	FREQ	%	CUMUL FREQ	CUMUL PERCENT
3	ELEM SCHOOL-3RD GRADE	1	0.0	1	0.0
7	ELEM SCHOOL-7TH GRADE	1	0.0	2	0.0
8	ELEM SCHOOL-8TH GRADE	8	0.1	10	0.2
9	HIGH SCHOOL-9TH GRADE	9	0.1	19	0.3
10	HIGH SCHOOL-10TH GRADE	41	0.6	60	0.9
11	HIGH SCHOOL-11TH GRADE	72	1.1	132	2.1
12	HIGH SCHOOL-12TH GRADE	4158	65.7	4290	67.8
13	COLLEGE-1 YR	857	13.5	5147	81.3
14	COLLEGE-2 YRS	701	11.1	5848	92.4
15	COLLEGE-3 YRS	223	3.5	6071	95.9
16	COLLEGE-4 YRS	202	3.2	6273	99.1
17	COLLEGE-5 YRS	30	0.5	6303	99.6
18	COLLEGE-6 YRS	17	0.3	6320	99.9
19	COLLEGE-7 YRS	4	0.1	6324	99.9
20	COLLEGE-8 YRS	4	0.1	6328	100.0

AGE

STATUS	VERBAL INTERPRETATION	FREQ	%	CUMUL FREQ	CUMUL PERCENT
17	AGE IN YEARS	1	0.0	1	0.0
18		6	0.1	7	0.1
19		43	0.7	50	0.8
20		226	3.6	276	4.4
21		573	9.1	849	13.4
22		591	9.3	1440	22.8
23		563	8.9	2003	31.7
24		508	8.0	2511	39.7
25		516	8.2	3027	47.8
26		448	7.1	3475	54.9
27		365	5.8	3840	60.7
28		356	5.6	4196	66.3
29		278	4.4	4474	70.7
30		264	4.2	4738	74.9
31		219	3.5	4957	78.3
32		215	3.4	5172	81.7
33		211	3.3	5383	85.1
34		193	3.0	5576	88.1
35		174	2.7	5750	90.0
36		135	2.1	5885	93.0
37		120	1.9	6005	94.9
38		87	1.4	6092	96.3
39		59	0.9	6151	97.2
40		32	0.5	6183	97.7
41		36	0.6	6219	98.3
42		36	0.6	6255	98.8

TABLE 2 (Continued)

FREQUENCIES

AGE (Continued)

STATUS	VERBAL INTERPRETATION	FREQ	%	CUMUL FREQ	CUMUL PERCENT
43		21	0.3	6276	99.2
44		26	0.4	6302	99.6
45		5	0.1	6307	99.7
46		7	0.1	6314	99.8
47		3	0.0	6317	99.8
48		4	0.1	6321	99.9
49		3	0.0	6324	99.9
50		1	0.0	6325	100.0
57		1	0.0	6326	100.0
63		1	0.0	6327	100.0
66		1	0.0	6328	100.0

RACE/ETHNIC GROUP

STATUS	VERBAL INTERPRETATION	FREQ	%	CUMUL FREQ	CUMUL PERCENT
1	AMERICAN INDIAN/ALASKAN	77	1.2	77	1.2
2	BLACK	977	15.4	1054	16.7
3	ORIENTAL/ASIAN	175	2.8	1229	19.4
4	WHITE	4774	75.4	6003	94.9
5	OTHER	325	5.1	6328	100.0

MOTHER'S EDUCATION

STATUS	VERBAL INTERPRETATION	FREQ	%	CUMUL FREQ	CUMUL PERCENT
1	ELEM SCHOOL-1ST GRADE	6	0.1	6	0.1
2	ELEM SCHOOL-2ND GRADE	5	0.1	11	0.2
3	ELEM SCHOOL-3RD GRADE	32	0.5	43	0.7
4	ELEM SCHOOL-4TH GRADE	24	0.4	67	1.1
5	ELEM SCHOOL-5TH GRADE	33	0.5	100	1.6
6	ELEM SCHOOL-6TH GRADE	108	1.7	208	3.3
7	ELEM SCHOOL-7TH GRADE	64	1.0	272	9.7
8	ELEM SCHOOL-8TH GRADE	340	5.4	612	9.7
9	HIGH SCHOOL-9TH GRADE	221	3.5	833	13.2
10	HIGH SCHOOL-10TH GRADE	303	4.8	1136	18.0
11	HIGH SCHOOL-11TH GRADE	221	3.5	1357	21.4
12	HIGH SCHOOL-12TH GRADE	3600	56.9	4957	78.3
13	COLLEGE-1 YR	176	2.8	5133	81.1
14	COLLEGE-2 YRS	463	7.3	5596	88.4
15	COLLEGE-3 YRS	87	1.4	5683	89.8

TABLE 2 (Continued)

FREQUENCIES

MOTHER'S EDUCATION (Continued)

STATUS	VERBAL INTERPRETATION	FREQ	%	CUMUL FREQ	CUMUL PERCENT
16	COLLEGE-4 YRS	448	7.1	6131	96.9
17	COLLEGE-5 YRS	51	0.8	6182	97.7
18	COLLEGE-6 YRS	91	1.4	6273	99.1
19	COLLEGE-7 YRS	8	0.1	6281	99.3
20	COLLEGE-8 YRS	47	0.7	6328	100.0

FATHER'S EDUCATION

STATUS	VERBAL INTERPRETATION	FREQ	%	CUMUL FREQ	CUMUL PERCENT
1	ELEM SCHOOL-1ST GRADE	17	0.3	17	0.3
2	ELEM SCHOOL-2ND GRADE	20	0.3	37	0.6
3	ELEM SCHOOL-3RD GRADE	68	1.1	105	1.7
4	ELEM SCHOOL-4TH GRADE	61	1.0	166	2.6
5	ELEM SCHOOL-5TH GRADE	53	0.8	219	3.5
6	ELEM SCHOOL-6TH GRADE	184	2.9	403	6.4
7	ELEM SCHOOL-7TH GRADE	90	1.4	493	7.8
8	ELEM SCHOOL-8TH GRADE	486	7.7	979	15.5
9	HIGH SCHOOL-9TH GRADE	265	4.2	1244	19.7
10	HIGH SCHOOL-10TH GRADE	283	4.5	1527	24.1
11	HIGH SCHOOL-11TH GRADE	191	3.0	1718	27.1
12	HIGH SCHOOL-12TH GRADE	3000	47.4	4718	74.6
13	COLLEGE-1 YR	159	2.5	4877	77.1
14	COLLEGE-2 YRS	402	6.4	5279	83.4
15	COLLEGE-3 YRS	86	1.4	5365	84.8
16	COLLEGE-4 YRS	551	8.7	5916	93.5
17	COLLEGE-5 YRS	68	1.1	5984	94.6
18	COLLEGE-6 YRS	149	2.4	6133	96.9
19	COLLEGE-7 YRS	31	0.5	6164	97.4
20	COLLEGE-8 YRS	164	2.6	6328	100.0

PRESENT MARITAL STATUS

STATUS	VERBAL INTERPRETATION	FREQ	%	CUMUL FREQ	CUMUL PERCENT
1	MARRIED-FIRST TIME	3205	50.6	3205	50.6
2	REMARRIED	673	10.6	3878	61.3
3	WIDOWED	5	0.1	3883	61.4
4	DIVORCED	340	5.4	4223	66.7
5	SEPARATED	185	2.9	4408	69.7
6	SINGLE-NEVER MARRIED	1920	30.3	6328	100.00

TABLE 2 (Continued)

FREQUENCIES

NUMBER OF DEPENDENTS

STATUS	VERBAL INTERPRETATION	FREQ	%	CUMUL FREQ	CUMUL PERCENT
1	NONE	2863	45.2	2863	45.2
2	1 DEP	1261	19.9	4124	65.2
3	2 DEPS	1299	20.5	5423	85.7
4	3 DEPS	629	9.9	6052	95.6
5	4 DEPS	204	3.2	6256	98.9
6	5 DEPS	48	0.8	6304	99.6
7	6 DEPS	17	0.3	6321	99.9
8	7 DEPS	3	0.0	6324	99.9
9	8 DEPS	3	0.0	6327	100.0
11	10 OR MORE DEPENDENTS	1	0.0	6328	100.0

LIKELIHOOD OF FINDING A GOOD CIVILIAN JOB

STATUS	VERBAL INTERPRETATION	FREQ	%	CUMUL FREQ	CUMUL PERCENT
1	NO CHANCE	75	1.2	75	1.2
2	VERY SLIGHT POSSIBILITY	117	1.8	192	3.0
3	SLIGHT POSSIBILITY	137	2.2	329	5.2
4	SOME POSSIBILITY	257	4.1	586	9.3
5	FAIR POSSIBILITY	316	5.0	902	14.3
6	FAIRLY GOOD POSSIBILITY	530	8.4	1432	22.6
7	GOOD POSSIBILITY	615	9.7	2047	32.3
8	PROBABLE	558	8.8	2605	41.2
9	VERY PROBABLE	838	13.2	3443	54.4
10	ALMOST SURE	949	15.0	4392	69.4
11	CERTAIN	1936	30.6	6328	100.0

ENOUGH FAMILY INCOME

STATUS	VERBAL INTERPRETATION	FREQ	%	CUMUL FREQ	CUMUL PERCENT
1	DELIGHTED	89	1.4	89	1.4
2	PLEASED	466	7.4	555	8.8
3	MOSTLY SATISFIED	1255	19.8	1810	28.6
4	MIXED	2448	38.7	4258	67.3
5	MOSTLY DISSATISFIED	1232	19.5	5490	86.8
6	UNHAPPY	502	7.9	5992	94.7
7	TERRIBLE	336	5.3	6328	100.0

TABLE 2 (Continued)

FREQUENCIES

SATISFACTION WITH MILITARY LIFE

STATUS	VERBAL INTERPRETATION	FREQ	%	CUMUL FREQ	CUMUL PERCENT
1	VERY DISSATISFIED	577	9.1	577	9.1
2	DISSATISFIED	686	10.8	1263	20.0
3	SOMEWHAT DISSATISFIED	1159	18.3	2422	38.3
4	NEITHER DISSATISFIED/SATISFIED	630	10.0	3052	48.2
5	SOMEWHAT SATISFIED	1402	22.2	4454	70.4
6	SATISFIED	1573	24.9	6027	95.2
7	VERY SATISFIED	301	4.8	6328	100.0

Table 3 shows the expected signs for each variable and compares the expected sign as hypothesized in Chapter III with that obtained from the models. Unless otherwise noted, the reader should assume that all models produced the same sign for the same variable.

Table 4 displays the Pearson correlation coefficients. Those variables considered to be highly correlated (with $R \geq .80$) are pay grade and enlistment period, age and pay grade, and age and enlistment period. Those variables considered to be significantly correlated (with $R \geq .50$) are the likelihood of reenlisting and satisfaction with military life; marital status and number of dependents; father's education and mother's education; and the likelihood of reenlisting and actual status in the service.

The following sections analyze each of the models, including an interpretation of the coefficients of the variables.

TABLE 3

TABLE OF SIGNS

VARIABLE NAME	EXPECTED SIGN	ACTUAL SIGN
WHITE	-	-
CURTAGE	+	+
MARSTAT	+	+
DEPS	+	- (+ IN MODEL 1)
FAMED	-	-
HSGRAD	+	+
SOMECOL	-	+
JUNIOR	-	-
CHIEF	+	+
FRSTERM	-	+(- IN MODEL 1)
SNDTERM	-	-
VSLITPOS	+	+
SLITPOS	+	+
SOMEPOS	+	+
FAIRPOS	+	+
FGOODPOS	+	+
GOODPOS	+	+
PROBABLE	+	+
VPROB	+	+
ALMSURE	+	+
CERTAIN	+	+
CIVJOB	-	+
TOTLSAT	+	+
FAMINC	+	-

TABLE 4

CORRELATION MATRIX

VARIABLE	STATUS	PAYGRD	ENL PER	TIMEREM	LIKRENL	CURTED	AGE	RACE
STATUS	1.0000	-0.3512	-0.2996	-0.0536	-0.5536	-0.0762	-0.3072	0.0645
PAY GRADE		1.0000	0.7558	0.0605	0.4641	0.2045	0.7508	-0.0019
ENL PERIOD			1.0000	0.9456	0.4577	0.1398	0.8099	-0.0593
TIME REMAIN				1.0000	0.8063	0.0156	0.0607	0.0119
LIKELIHD RENL					1.0000	0.06538	0.4362	-0.0958
CURRENT ED						1.0000	0.2966	-0.0046
AGE							1.0000	-0.0413
RACE								1.0000

TABLE 4 (Continued)

CORRELATION MATRIX

VARIABLE	MOMED	DADED	MARSTAT	DEPS	CIVJOB	FAMINC	MILSAT
STATUS	0.0937	0.1028	0.2252	-0.2245	0.1207	0.0974	-0.3585
PAY GRADE	-0.1456	-0.1743	-0.3767	0.4423	0.0063	-0.1007	0.2981
ENL PERIOD	-0.1785	-0.2107	-0.3741	0.4969	-0.0374	-0.0701	0.2814
TIME REMN	-0.0276	-0.0034	-0.0503	0.0474	-0.0222	-0.0041	0.0652
LIKELIHD RENL	-0.1214	-0.1433	-0.3213	0.3358	-0.1949	-0.1576	0.5700
CURRENT ED	0.0368	0.0455	-0.0815	0.0757	0.0631	0.0121	0.0416
AGE	-0.1854	-0.1997	-0.3684	0.4978	-0.0254	-0.0738	0.2642
RACE	0.0228	0.0899	0.0535	-0.0849	0.0802	0.0172	-0.0427

VARIABLE	MOMED	DADED	MARSTAT	DEPS	CIVJOB	FAMINC	MILSAT
MOMED	1.0000	0.5419	0.1261	-0.1574	0.0479	0.0478	-0.0696
DADED		1.0000	0.1315	-0.1659	0.0552	0.0353	-0.0733
MARSTAT			1.0000	-0.5038	0.0329	0.0665	-0.1837
DEPS				1.0000	-0.0218	0.0176	0.1814
CIVJOB					1.0000	0.0923	-0.1375
FAMINC						1.0000	-0.3737
MILSAT							1.0000

B. DEMOGRAPHIC MODEL RESULTS

The demographic model consists of the following independent variables as defined in Chapter III: race, age at time of survey, current marital status, number of dependents, parents' education level, highest grade of education, pay grade at time of survey, and reenlistment period at time of survey. The dependent variable is YESNAV, which offers a binary choice of either leaving the Navy or remaining on active duty. This model was estimated using the logit technique; Table 5 indicates the coefficient values of every variable and its corresponding

chi-square value. The chi-square measure is used to test the significance of the coefficients of the individual variables (i.e., whether different from zero) as well as entire models. By comparing the computed value with the critical value, the significance of the variable can be determined.

The critical chi-square will vary with the degrees of freedom (DF) and level of confidence. The critial values for one degree of freedom are

LEVEL OF CONFIDENCE (%)	CHI-SQUARE
99.0	6.63
97.5	5.02
95.0	3.84
90.0	2.71

Table 5 also contains the classification table with appropriate chi-square and degrees of freedom data.

TABLE 5

TABLE OF COEFFICIENTS

VARIABLE	BETA COEFFICIENT	STD ERROR	CHI-SQUARE
WHITE	-0.4729	0.0699	45.74*
CURTAGE	0.0776	0.0103	56.25*
MARSTAT	0.5703	0.0715	63.59*
DEPS	0.1869	0.0744	6.31*
FAMED	-0.0998	0.0628	2.53
HSGRAD	0.5736	0.2083	7.58*
SOMECOL	0.4715	0.2137	4.87*
JUNIOR	-0.5827	0.0779	55.93*
CHIEF	0.6949	0.0935	55.28*
FRSTERM	-0.4583	0.1302	12.38*
SNDTERM	-0.4763	0.1048	20.66*

*SIGNIFICANT AT THE 95 PERCENT CONFIDENCE LEVEL

MODEL CHI-SQUARE = 1745.83 WITH 11 DF

TABLE 5 (Continued)

TABLE OF COEFFICIENTS

CLASSIFICATION TABLE

PREDICTED

TRUE		NEGATIVE	POSITIVE	TOTAL
	NEGATIVE	2062	652	2714
	POSITIVE	1189	2425	3614
	TOTAL	3251	3077	6328

SENSITIVITY: 67.1% SPECIFICITY: 76.0% CORRECT: 70.9%

FALSE POSITIVE RATE: 21.2% FALSE NEGATIVE RATE: 36.6%

1. Race (WHITE)

In this model, the variable WHITE indicates that minorities have a greater tendency to remain in the service compared to whites. This result parallels that of previous studies. This variable is significant at the 99.5 percent confidence level.

2. Age (At Time of Survey—CURTAGE)

Age is a continuous variable, and the results show that the older an individual is, the more likely he is to remain in the Navy. This variable is significant at the 99.5 percent confidence level.

3. Marital Status (Current—MARSTAT)

Those members who are married for the first time or remarried have a greater tendency to stay in the service. The positive sign was as expected. MARSTAT is significant at the 99.5 percent level of confidence.

4. Number of Dependents (DEPS)

The dividing point for number of dependents was one or more dependents as compared to no dependents. The results show that those individuals with one or more dependents have an increased tendency to reenlist over those with no dependents. DEPS is statistically significant at the 97.5 level.

5. Parents' Education (FAMED)

When considering the higher of the two parents' educations, a member with parents who have no college education had a greater chance of staying in the service than one whose parents had at least one year of college. This variable is not considered to be statistically significant.

6. Highest Grade of Education (HSGRAD and SOMECOL)

Both variables in this case produced similar results; those individuals who completed a high-school education or a high-school education along with some college had a greater tendency to remain in the service than those individuals who received less than 12 years of schooling. It was expected that those with some college would have a tendency to leave the Navy, but the positive result might be an indication of the more technical ratings in the service that require those individuals with advanced schooling. The HSGRAD variable sign was as expected. SOMECOL was statistically significant at the 95 percent confidence level; HSGRAD is significant at the 99 percent level.

7. Pay Grade (At Time of Survey—JUNIOR and CHIEF)

As expected, the more junior personnel (E1-E4) have a greater tendency to leave the service, while the more senior individuals (E7-E9) tend to remain in the Navy. Both variables are significant at the 99.5 percent confidence level.

8. Reenlistment Period (At Time of Survey—FRSTERM and SNDTERM)

The reference group in this case are those members serving on their third or later term of enlistment. These individuals had a greater chance of remaining in the service than those serving in their first or second enlistment period. This result was expected. Also anticipated was the fact that those members serving on their second enlistment have a greater tendency to leave the service. FRSTERM and SNDTERM are significant at the 99.5 percent confidence level.

C. DEMOGRAPHIC AND INTENTION MODEL RESULTS

This model consists of the same demographic characteristics as in the previous model, with the addition of 10 dummy variables that analyze various stages of intentions to reenlist.

Overall, the addition of the intentions variable slightly reduces the chi-squares of the demographic variables. No noticable changes occurred in race, age, marital status, parents' education, or pay grade. However, number of dependents (DEPS) shifted from being significant in the previous model to being insignificant in this model. The coefficient and chi-square for DEPS approaches zero; the decrease in values may be due to the correlation between number of dependents and

intentions (R = 0.36). The level of confidence for HSGRAD decreases from 99 percent to 95 percent. The level of confidence for SOMECOL decreases from 95 percent to 90 percent. FRSTERM and SNDTERM were statistically significant in the first model, but they lose the significance in this model. This can be partially attributed to the correlation between intentions and term of enlistment (R = 0.47). There was also a sign change for FRSTERM; this is not important, though, because its coefficient and chi-square approach zero. Table 6 indicates the coefficient values of each variable and its corresponding chi-square values. It also contains the classification table with appropriate chi-square and degrees of freedom data.

TABLE 6

TABLE OF COEFFICIENTS

VARIABLE	BETA COEFFICIENT	STD ERROR	CHI-SQUARE
WHITE	-0.2339	0.0826	8.02*
CURTAGE	0.0635	0.0120	27.85*
MARSTAT	0.4051	0.0856	22.38*
DEPS	-0.0017	0.0892	0.00
FAMED	-0.0893	0.0742	1.45
HSGRAD	0.4854	0.2456	3.91*
SOMECOL	0.4261	0.2515	2.87
JUNIOR	-0.5054	0.0929	29.60*
CHIEF	0.5536	0.1082	26.16*
FRSTERM	0.0597	0.1528	0.15
SNDTERM	-0.1775	0.1221	2.12
VSLITPOS	0.8209	0.1999	16.86*
SLITPOS	1.0849	0.2028	28.63*
SOMEPOS	1.5439	0.1693	83.18*
FAIRPOS	1.7886	0.1813	97.30*
FGOODPOS	1.8456	0.1613	131.00*
GOODPOS	2.3339	0.1643	202.78*
PROBABLE	2.4609	0.1818	183.17*
VPROB	2.6062	0.1769	216.99*
ALMSURE	2.8573	0.1459	383.27*
CERTAIN	3.1094	0.1033	906.54*

*SIGNIFICANT AT THE 95 PERCENT CONFIDENCE LEVEL

MODEL CHI-SQUARE = 3336.49 WITH 21 DF

TABLE 6 (Continued)

TABLE OF COEFFICIENTS

CLASSIFICATION TABLE

PREDICTED

TRUE		NEGATIVE	POSITIVE	TOTAL
	NEGATIVE	2239	475	2714
	POSITIVE	662	2952	3614
	TOTAL	2901	3427	6328

SENSITIVITY: 81.7% SPECIFICITY: 82.5% CORRECT: 82.0%

FALSE POSITIVE RATE: 13.9% FALSE NEGATIVE RATE: 22.8%

The addition of the "likelihood of reenlisting" variables (VSLITPOS, SLITPOS, SOMEPOS, FAIRPOS, FGOODPOS, GOODPOS, PROBABLE, VPROB, ALMSURE, and CERTAIN) was the primary reason for the lower chi-square values of the demographic variables. In order to observe the full impact of intentions upon the actual reenlistment decision, a series of 10 dummy variables was created to observe every response category to the question, "How likely are you to reenlist at the end of your current term of service?" Each of these variables indicated that those who had even a very slight possibility of reenlisting were more likely to remain in the service. The effect on reenlistment increased with each category; coefficient values steadily increased, as did the chi-square values. All 10 dummy variables are statistically significant at the 99.5 percent level of confidence.

By obtaining the difference between the chi-squares of the first and second models as well as the difference in degrees of freedom,

the fit of the second model can be compared to the first. The calculated chi-square for the difference in the two models is 1590.66 with nine degrees of freedom. Because it is larger than the critical chi-square of 21.7 at the 99 percent level of confidence, the second model is a better fit than the first. This was as expected, since intentions appear to have a major effect on reenlistment behavior.

D. DEMOGRAPHIC, INTENTION, AND SATISFACTION MODEL RESULTS

Overall, the results from this model did not drastically change from those obtained in the second model. All coefficients retained the same signs and coefficient values increased or decreased in small increments. The addition of the job satisfaction variables caused the other variables' chi-square values to decrease slightly; this does not affect the overall significance of the model. The only notable changes occurred with highest grade of education. HSGRAD decreased in level of confidence from 95 to 90 percent, while SOMECOL lost its significance; SOMECOL was barely significant in the second model. Table 7 indicates the coefficient values of every variable and its corresponding chi-square value; it also contains the classification table with appropriate chi-square and degrees of freedom data.

1. Likelihood of Finding a Good Civilian Job (CIVJOB)

This variable did not affect the model results; it is statistically insignificant at the 90 percent confidence level. Apparently, when the perception of the availability of a good civilian job exists, it does not

TABLE 7

TABLE OF COEFFICIENTS

VARIABLE	BETA COEFFICIENT	STD ERROR	CHI-SQUARE
WHITE	-0.2397	0.0827	8.40*
CURTAGE	0.0638	0.0121	27.78*
MARSTAT	0.4154	0.0859	23.36*
DEPS	-0.0062	0.0897	0.00
FAMED	-0.0963	0.0744	1.68
HSGRAD	0.4680	0.2443	3.67**
SOMECOL	0.4041	0.2504	2.61
JUNIOR	-0.4954	0.0934	28.16*
CHIEF	0.5561	0.1087	26.19*
FRSTERM	0.0667	0.1534	0.19
SNDTERM	-0.1651	0.1225	1.82
CIVJOB	0.1178	0.1019	1.34
TOTLSAT	0.3387	0.0793	18.25*
FAMINC	-0.0874	0.0769	1.29
VSLITPOS	0.8111	0.2018	16.15*
SLITPOS	1.0493	0.2041	26.44*
SOMEPOS	1.5045	0.1703	78.03*
FAIRPOS	1.7261	0.1833	88.72*
FGOODPOS	1.7641	0.1633	116.65*
GOODPOS	2.2229	0.1676	175.83*
PROBABLE	2.3500	0.1843	162.58*
VPROB	2.4733	0.1809	187.01*
ALMSURE	2.7367	0.1507	329.82*
CERTAIN	2.9545	0.1117	699.79*

*SIGNIFICANT AT THE 95 PERCENT CONFIDENCE LEVEL

**SIGNIFICANT AT THE 90 PERCENT CONFIDENCE LEVEL

MODEL CHI-SQUARE = 3355.80 WITH 24 DF

CLASSIFICATION TABLE

PREDICTED

		NEGATIVE	POSITIVE	TOTAL
TRUE	NEGATIVE	2229	485	2714
	POSITIVE	667	2947	3614
	TOTAL	2896	3432	6328

SENSITIVITY: 81.5% SPECIFICITY: 82.1% CORRECT: 81.8%

FALSE POSITIVE RATE: 14.1% FALSE NEGATIVE RATE: 23.0%

influence a member's reenlistment behavior. Previous studies have indicated that CIVJOB is a significant factor in the reenlistment decision. According to this third model, intentions are the real indicator of reenlistment behavior. A separate model (not listed here) was run, leaving this variable out; the chi-square value for the model did not change with the deletion of this variable.

2. Total Job Satisfaction (TOTLSAT)

According to this model, the more satisfied a Navy member is with the service in general, the greater the chance he will reenlist. This variable is statistically significant at the 99.5 percent level of confidence. As noted in previous studies, total job satisfaction plays a major role in reenlistment behavior patterns.

3. Satisfaction with Family Income (FAMINC)

The inclusion of FAMINC did not affect the reenlistment behavior of Navy members, and it is statistically insignificant. A separate model (not listed here) was run, leaving this variable out; the chi-square value for the model did not change with the deletion of this variable.

By obtaining the difference between the chi-squares of the second and third models as well as the difference in degrees of freedom, the fit of the third model compared to the second can be determined. The calculated chi-square for the difference in the two models is 19.31 with three degrees of freedom. Because it is larger than the critical chi-square of 11.34 at the 99 percent level of confidence, the third model is a better fit than the second. This was as expected,

because the overall military satisfaction variable has a significant effect on reenlistment behavior.

E. INTENTIONS AS A CONTINUOUS INDEPENDENT VARIABLE

In order to further explore the power of the intentions variable on the reenlistment decision, a fourth model was estimated. In this model, instead of dividing the variable into a series of dummy variables, it was treated as a continuous variable. The results further support the previous models that show the intentions variable as a very powerful predictor. When intentions is analyzed as a continuous independent variable, it summarizes the results obtained in the second and third model. The chi-square value is 942.30. There are no other significant differences between the third model and this model.

Table 8 indicates the coefficient values of the variables and their corresponding chi-square values; it also contains the classification table with appropriate chi-square and degrees of freedom data.

By obtaining the difference between the model chi-squares of the third and fourth models as well as the difference in degrees of freedom, the fit of the fourth model compared to the third can be determined. The calculated chi-square for the difference in the two models is 7.54 with nine degrees of freedom. Because it is smaller than the critical chi-square of 14.68 at the 90 percent level of confidence, the fourth model is a better fit than the third. The addition of nine more degrees of freedom did not raise the model chi-square enough; thus, the 10 dummy intentions variable model is no more significant than the continuous intentions variable model. Treating intentions as a

series of dummy variables does not any more explanatory power than it does when intentions is treated as a continuous variable.

TABLE 8

TABLE OF COEFFICIENTS

LOGIT ESTIMATION OF REENLISTMENT BEHAVIOR

(INTENTIONS AS A CONTINUOUS INDEPENDENT VARIABLE)

VARIABLE	BETA COEFFICIENT	STD ERROR	CHI-SQUARE
INTENTIONS	0.2763	0.0090	942.30**
WHITE	-0.2554	0.0824	9.61**
CURTAGE	0.0634	0.0120	27.85**
MARSTAT	0.4151	0.0857	23.47**
DEPS	-0.0039	0.0894	0.00
FAMED	-0.0983	0.0742	1.76
HSGRAD	0.4491	0.2446	3.37*
SOMECOL	0.4034	0.2506	2.59
JUNIOR	-0.4901	0.0929	27.84**
CHIEF	0.5528	0.1082	26.11**
FRSTERM	0.0814	0.1524	0.29
SNDTERM	-0.1471	0.1219	1.46
CIVJOB	0.1067	0.1023	1.09
TOTLSAT	0.3326	0.0789	17.74**
FAMINC	-0.0838	0.0765	1.20

*SIGNIFICANT AT THE 90 PERCENT CONFIDENCE LEVEL

**SIGNIFICANT AT THE 95 PERCENT CONFIDENCE LEVEL

MODEL CHI-SQUARE = 3348.26 WITH 15 DF

CLASSIFICATION TABLE

		PREDICTED		
		NEGATIVE	POSITIVE	TOTAL
TRUE	NEGATIVE	2276	438	2714
	POSITIVE	703	2911	3614
	TOTAL	2979	3349	6328

SENSITIVITY: 80.5% SPECIFICITY: 83.9% CORRECT: 82.0%

FALSE POSITIVE RATE: 13.1% FALSE NEGATIVE RATE: 23.6%

Despite this fact, from a career counselor's standpoint, the continous intentions variable model is not preferred over the dummy variable model. The rationale behind this thought is that it is more advantageous to understand the degree of intention to reenlist; by knowing the degree of seriousness of an individual's pending reenlistment decision, concerned personnel can more effectively devote time to members who are not as sure about the decision to reenlist.

Further analysis can be conducted by analyzing the difference in size among the 10 dummy intentions variables compared to the size of the continuous intentions coefficient (0.2763). The larger increases among the 10 dummy variables occur between the reference group (no chance of reenlistment) and VSLITPOS (a difference of .8111), between SOMEPOS and SLITPOS (difference of 0.4553), and between GOODPOS and FGOODPOS (difference of 0.4588). These differences are larger than the continuous variable coefficient and indicate more significant decision-making levels of certainty in the reenlistment decision process. All other coefficient differences are less than the continuous variable coefficient value of 0.2763. This is the only case where the chi-square value does not increase over the previous value. It must be assumed that PROBABLE would have a larger chi-square than GOODPOS based on the overall pattern of increasing values. The discrepancy appears to be because GOODPOS has a higher response rate than PROBABLE.

F. INTENTIONS AS A CONTINUOUS DEPENDENT VARIABLE

Based on the results obtained in the second and third models, the intentions variables have a very powerful effect on reenlistment behavior. The possibility of a causal relationship between demographic and job satisfaction variables and intentions is very great; this may account for the very large chi-square values for the intention dummy variables. To further analyze this relationship, a fifth model was estimated with the continuous intentions variable as the dependent variable and the demographic and job satisfaction variables as the independent variables. Ordinary Least Squares was used to estimate the model, and the following variables were found to be statistically significant at the 10 percent level of significance or better: WHITE, CURTAGE, MARSTAT, DEPS, JUNIOR, CHIEF, FRSTERM, SNDTERM, CIVJOB, and TOTLSAT. Of interest is the fact that although race, number of dependents, first- and second-term enlistees, and potential of obtaining a good civilian job are not significant in the second and third models, they are significant in this model. These results indicate that the intentions variables in the second, third, and fourth models absorb some of the effects that these five variables have on reenlistment behavior. Table 9 indicates the coefficient values of the variables and their corresponding t-statistic. The t-statistic is another measure of a variable's level of significance. To determine the significance, the computed t-score obtained from the printout is compared with a critical t-statistic obtained from a table; the critical t-stat will vary

with the degrees of freedom and the level of confidence. The critical values for very large samples are the same as the normal distribution:

LEVEL OF CONFIDENCE (%)	T-STATISTIC
99.0	2.58
98.0	2.33
95.0	1.96
90.0	1.65

Table 9 also contains the analysis of variance along with R^2 and adjusted R^2, and the results of the F-test. R^2, otherwise known as the coefficient of determination, is used to describe the degree of fit of the model; the higher the R^2, the better the fit. However, R^2 can increase by simply adding independent variables which may not contribute to an improvement in the fit of the model. To conteract this, adjusted R^2 is introduced. Adjusted R^2 compensates for the number of degrees of freedom in the model and provides for a more accurate measure of fit. Another way to measure fit is by the F-test mentioned above. It is one of the most commonly used methods to test the overall significance of a regression [Ref. 15:p. 114].

The adjusted R^2 value of .4276 indicates a good fit of the model. Additionally, the computed F-statistic for this model is 338.52. Because it is larger than the critical value of 2.08 (with 14 degrees of freedom in the numerator and 6313 degrees of freedom in the denominator), this model proves to be significant. It shows that the demographic and satisfaction type variables adequately explain the driving forces behind intentions to reenlist.

TABLE 9

TABLE OF COEFFICIENTS
REGRESSION ESTIMATION OF REENLISTMENT INTENTIONS
(INTENTIONS AS A CONTINUOUS DEPENDENT VARIABLE)

VARIABLE	BETA COEFFICIENT	STD ERROR	T-STATISTIC
WHITE	-0.6613	0.5805	-6.11*
CURTAGE	0.0635	0.0142	4.49*
MARSTAT	0.7711	0.1186	6.50*
DEPS	0.6193	0.1229	5.04*
FAMED	-0.1456	0.0991	-1.47
HSGRAD	0.5068	0.3225	1.57
SOMECOL	0.4512	0.3299	1.37
JUNIOR	-0.7043	0.1347	-5.23*
CHIEF	0.9744	0.1445	6.75*
FRSTERM	-1.6438	0.2018	-8.15*
SNDTERM	-1.0313	0.1547	-6.67*
CIVJOB	-1.3631	0.1328	-10.34*
TOTLSAT	3.7220	0.0993	37.48*
FAMINC	0.0707	0.1021	0.69

*SIGNIFICANT AT THE 90 PERCENT CONFIDENCE LEVEL

ANALYSIS OF VARIANCE

SOURCE	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARE
MODEL	14	62691.6449	4477.9746
ERROR	6313	83503.5889	13.2272
C TOTAL	6327	146195.2300	

ROOT MSE	3.6369	R-SQUARE	0.4288
DEP MEAN	5.4140	ADJ R-SQ	0.4276

G. PREDICTION RESULTS

Analysis of the classification tables of the various models lends itself to revealing the accuracy of the predictability of the models. Comparing the accuracy of the demographics model with the demographics and intentions model shows that the second model is a more accurate gauge of reenlistment behavior than the first. The first model

correctly predicts reenlistment behavior 70.9 percent of the time, while the second, third, and fourth models correctly predict behavior about 82.0 percent of the time.

Because the possibility exits that the demographic and job satisfaction variables affect reenlistment behavior directly and indirectly via the intentions variable, calculations were made to identify the various effects. Two models were used to explain the recursive nature of the intentions variable—one consists of intentions as a continuous independent variable (which shows direct effects of intentions on behavior) analyzed using logit, while the other consists of intentions as a continuous dependent variable (which allows calculation of the indirect effects of the variables on behavior) analyzed using OLS. It follows that $R = f(X_j, I)$ and $I = g(X_j)$, where R = reenlistment behavior as a function of demographic and job satisfaction variables (X_j) and intentions (I). Intentions (I) are, in turn, a function of X_j. By taking the partial derivative of R and I with respect to X_j, and R with respect to I, the different indirect effects can be determined. More specifically, $\partial R/\partial X_j = \partial f/\partial X_j + (\partial g/\partial X_j \cdot \partial f/\partial I)$. The first term on the right-hand side is the direct effect of the Xs, whereas the second term is the indirect effect. Table 10 summarizes these effects.

In every case, indirect effects increased the total effects of the demographic and job satisfaction variables. The most significant increases occurred with TOTLSAT and WHITE. Because satisfaction with military life in general is the primary factor affecting reenlistment intentions, it increases the total effect by over 200

percent. TOTLSAT obviously is a powerful variable. The indirect effects of WHITE on reenlistment intentions increased the total effect by 72 percent, followed by MARSTAT and CHIEF with 57 and 49 percent increases in total effect, respectively. JUNIOR and AGE were found to have the smallest increase in total effect of intentions due to the indirect effects (38 and 28 percent, respectively). From the results in Table 10, it can be seen that increased satisfaction with military life and increased seniority most significantly affect the likelihood that an individual will reenlist.

TABLE 10

DIRECT AND INDIRECT EFFECTS OF SIGNIFICANT VARIABLES ON REENLISTMENT BEHAVIOR

VARIABLE	DIRECT EFFECT (LOGIT)	INDIRECT EFFECT (OLS)	TOTAL EFFECT
WHITE	-0.2554	-0.1827	-0.4381
CURTAGE	0.0634	0.0175	0.0809
MARSTAT	0.4151	0.2131	0.6282
JUNIOR	-0.4901	-0.1946	-0.6847
CHIEF	0.5528	0.2692	0.8220
TOTLSAT	0.3326	1.0284	1.3609

*SIGNIFICANT AT THE 90 PERCENT CONFIDENCE LEVEL IN BOTH MODELS

V. RECOMMENDATIONS AND CONCLUSIONS

A. RECOMMENDATIONS

There are many options the Navy could take to improve upon reenlistment behavior of personnel. Because a majority of those potential reenlistees have been trained by the Navy and have practical experience, it is generally less costly to make additional efforts to retain them than it would be to allow them to leave the service uncontested and increase the number of recruits. The costs of general and specific training are ever increasing, and because of the transferability of both types of training to the civilian community, the Navy should increase its retention efforts.

The first recommendation concerns the area of recruiting. If the recruiting budget is allowed to increase, recruiters will be able to be more selective when searching for prospective recruits, while at the same time expanding the pool of candidates for naval service. By accepting only those individuals with high-school diplomas, the chances for these same individuals to reenlist increases significantly. Currently, recruiters seek out new high-school graduates from the ages of 17 through 22. The optimal combination for more qualified naval personnel is a combination of raising the standards of acceptance and screening a larger group of candidates.

Second, by obtaining feedback from the Navy's family service centers, the Navy can better analyze a spouse's likes and dislikes about the

service. This study shows that married members have a greater propensity for reenlistment; because the presence of a spouse appears to be very important to the member's reenlistment behavior, it would be wise for the Navy to acknowledge problem areas from the spouse's point of view and attempt to remedy the situation, if at all possible. Of course, it is expected that such items as time at sea and working hours will affect wives' opinions in a negative sense, but there is not much the Navy can do to lessen sea time or long working hours. Perhaps items such as medical facilities and care and basic benefits and privileges can be improved upon at no great expense to the Navy. Small improvements in services and facilities used by spouses might assist in maintaining a positive spouse attitude towards the Navy.

The third recommendation is to work very closely with those E1 through E4 personnel who are within 12 months of their reenlistment decision. Because intentions to reenlist have a very powerful effect on actual reenlistment behavior, career counselors must work hard to make the reenlistment option the best option for junior personnel. Spending more time discussing career choices with potential reenlistees and making them aware of the benefits available (e.g., Selected Reenlistment Bonuses) may assist in the retention effort. These members who are low in the ranking structure have a greater tendency to leave the Navy that those who are E5 or above. Therefore, the counselors must make an increased effort for those junior individuals. Most of these men have probably attended at least one Navy training-intensive school, so it would not be cost effective to have them leave the

service; career counselors should concentrate their efforts on this group. By stressing the SRB program, the counselors will be more successful; those reenlistees who have more schooling usually command a larger SRB. Studies by Warner, Cymrot, and Warner and Goldberg [Refs. 11, 12, and 13] prove this point.

Concerning the fourth recommendation, the Navy's career counselors should be a very motivated, persuasive set of individuals. Currently, the Navy screens its counselors, but it is recommended that they screen even more carefully. Perhaps more interviews and role-playing sessions should be used when choosing career counselors. In conjunction with better counselors, there should be more counselors per unit to provide for increased attention to potential reenlistees. Also, division officers and chiefs should be made aware of the significance of "talking up" the Navy to the potential reenlistee when he is at the 12-month point prior to the reenlistment eligibility date. This author's experience along with results from other studies show that a supervisor's leadership capabilities and attitude toward the individual play a key role in the reenlistment decision. The division officers and chiefs should take advantage of their influence on the division members and emphasize the attractiveness of a naval career.

Another way to improve reenlistment behavior is to periodically survey those members approaching a reenlistment decision point. The focus of the survey should be on those factors that affect total satisfaction with military life. Items such as base facilities, reenlistment bonuses, medical and dental services, working environment, and work

load (to name a few) are important to Navy personnel. These items directly contribute to overall military satisfaction. This study shows that a member who is satisfied with military life has a much higher probability of reenlisting. A survey is an excellent method of gauging the effectiveness of the factors that may affect the reenlistment behavior of individuals. Attempts should be made, where possible, to improve upon deficient areas based on survey data.

The fifth recommendation is to vary the amount of attention placed on an individual who is facing the reenlistment decision. This study's results enforce that idea which is very logical—a member who is not as likely to intend to reenlist requires more attention by the career counselor, division officer, and division chief. The possibility of increasing the member's intention to reenlist could be greatly improved by spending a few more hours per month discussing the advantages of reenlisting with the individual. Often, special attention is all it takes to push a wavering potential reenlistee over to the reenlistment side. It also follows that those who are "almost sure" or "certain" that they will reenlist will require less time with counselors and superiors.

One interesting observation obtained from this study is that there is a small group of individuals (7.6 percent of the sample) who, although they indicate no intention to reenlist, actually do sign another contract. This result is a good indication that career counselors should not "give up" on a member who states there is no chance for reenlistment. For whatever reason, these individuals

change their minds—perhaps at the hands of insistent career counselors and division officers and chiefs.

The final recommendation is to retain the Selective Reenlistment Bonus Program. Based on studies by Warner [Ref. 11], Cymrot [Ref. 12] and Warner and Goldberg [Ref. 13], these bonuses are a primary catalyst for military members to reenlist. When a member is indecisive about whether to reenlist, the existence of a large sum of money may be the factor that causes him to reenlist. The advantage of the SRB system is that it can target those ratings and pay grades where retention needs are the greatest. The Navy reaps the most benefit from the bonus program when it retains members trained in the technical fields where schooling is extensive and costly. This is especially true concerning those enlisted members in the nuclear-power ratings. Cymrot's study also mentions the fact that the larger the bonus, the greater the probability that an individual will reenlist.

In conjunction with the recommendation to continue with the SRB program, it is also recommended that the next DOD Survey include questions about a member's satisfaction with his upcoming bonus, should he reenlist. A question should be included that asks the amount of his last bonus and the amount of his next bonus. Finally, a question should be added that asks, "How much influence did your SRB have on your current enlistment?" Inclusion of these questions will assist in further analyzing the effects of Selective Reenlistment Bonuses on reenlistment behavior.

B. CONCLUSIONS

As hypothesized at the beginning of this thesis, intentions to reenlist do accurately predict reenlistment behavior. All of the models presented reveal that the intentions variable, whether divided into a series of dummy variables or left as a continuous variable, has tremendous predictive power when assessing actual reenlistment behavior. Once an individual has entered the 12-month period prior to the reenlistment decision point, his intention to reenlist, affected by various factors in his work and family environment, is a very accurate gauge of his actual reenlistment behavior.

It was discovered that numerous variables affect reenlistment behavior. These can be divided into three primary categories: demographic variables, intention variables, and job satisfaction variables. Of these categories, it was shown that the intention variables had the greatest effect on the member's behavior. Other factors, such as age, marital status, pay grade, and satisfaction with military life influenced reenlistment behavior, while factors such as race, number of dependents, education level, and satisfaction with family income did not significantly influence the actual behavior. Based on previous studies and the results from the fifth model of this thesis, intentions to reenlist are effected by the same demographic and job satisfaction variables used in the third model. Factors directly responsible for improved intentions to reenlist are race, age, marital status, number of dependents, pay grade, term of enlistment, perception of good chances of getting a good civilian job, and overall satisfaction with the military.

However, race, number of dependents, term of enlistment, and perception of good chances of getting a good civilian job are not significantly related to reenlistment behavior independently of intentions as (an) independent variable(s). Therefore, it can be concluded that these four variables are not directly related to actual reenlistment behavior but rather affect reenlistment through their influence on intentions.

Based on the three models where intentions was used to predict behavior, an individual's intentions to reenlist are very significant when analyzing behavior, and they can be even more valuable when they are analyzed in incremental steps. The varying degrees of intention to reenlist are analyzed in the third model and show the steadily increasing effects of the levels of reenlisting (from "very slight possibility" to "certain"). The more certain the response rate, the greater the chance that the individual will reenlist.

A vital link in the goal for increased retention in the naval service is the career counselor, division officer, and division chief. Based on this author's experience, these individuals most directly affect a member's intentions to reenlist and, subsequently, the actual decision. Based on this analysis, when counseling potential reenlistees, they should focus on those members in the E1 through E4 category. This study shows that this set of junior personnel are more likely to leave the service than those E5 and up. Knowing this group's intentions to reenlist can assist the key players with the often-nebulous decision of when and with whom does one "talk up" the reenlistment decision.

Aiming for the market that requires the most influencing is the goal. These individuals will need special attention to ensure that the intention to reenlist is high.

APPENDIX

PROGRAMMING CODE

FILE: THESIS14 SAS A1

```
//THESIS14 JOB (3284,9999),'REARDEN',CLASS=G
//  EXEC SAS,REGION=2500K
//WORK DD UNIT=SYSDA,SPACE=(CYL,(12,8))
//DATAIN DD DISP=SHR,DSN=MSS.F3964.MEMBERS
//SYSIN     DD *
DATA NAVENL;
SET DATAIN.MEMBER1;
IF O35E34 = 1;
IF O5E5 LE 9;
IF E8 = -1 OR E8 = . THEN DELETE;
IF E9 = -1 OR E9 = 6 OR E9 = 7 OR E9 = 5 THEN DELETE;
IF E30 = -1 OR E30 = -8 OR E30 = -5 OR E30 = . THEN DELETE;
IF O110E106 EQ -1 THEN DELETE;
IF O39E38 EQ -1 THEN DELETE;
IF O49E46B = -1 OR O49E46B = -8 THEN DELETE;
IF O49E46A = -1 OR O49E46A = -8 THEN DELETE;
IF O51E48 = -1 THEN DELETE;
IF O96E92 = -1 OR O96E92 = -8 THEN DELETE;
IF E42 = -1 OR E42 = . THEN DELETE;
IF O106E102 = -1 OR O106E102 = -3 THEN DELETE;
IF STATUS = 4 THEN DELETE;
IF E30 = -6 THEN E30 = 0;

IF E8 = 1 THEN FRSTERM = 1;
  ELSE FRSTERM = 0;
IF E8 = 2 THEN SNDTERM = 1;
  ELSE SNDTERM = 0;
IF STATUS = 1 THEN YESNAV = 1;
  ELSE YESNAV = 0;
IF O5E5 LE 4 THEN JUNIOR = 1;
  ELSE JUNIOR = 0;
IF O5E5 GE 6 THEN CHIEF = 1;
  ELSE CHIEF = 0;
IF E30 GE 6 THEN CARINT = 1;
  ELSE CARINT = 0;
IF O110E106 GT 4 THEN TOTLSAT = 1;
  ELSE TOTLSAT = 0;
IF O39E38 = 4 THEN WHITE = 1;
  ELSE WHITE = 0;
IF O49E46B GE 13 THEN HIDADED = 1;
  ELSE HIDADED = 0;
IF O49E46A GE 13 THEN HIMOMED = 1;
  ELSE HIMOMED = 0;
IF HIDADED = 1 OR HIMOMED = 1 THEN FAMED = 1;
  ELSE FAMED = 0;
IF O51E48 LE 2 THEN MARSTAT = 1;
  ELSE MARSTAT = 0;
IF O67E64 GT 1 THEN DEPS = 1;
  ELSE DEPS = 0;
IF O96E92 GE 6 THEN CIVJOB = 1;
  ELSE CIVJOB = 0;
IF E42 = 12 THEN HSGRAD = 1;
  ELSE HSGRAD = 0;
IF E42 GT 12 THEN SOMECOL = 1;
  ELSE SOMECOL = 0;
IF O106E102 LE 4 THEN FAMINC = 1;
  ELSE FAMINC = 0;
INTENTNS = E30;
CURTAGE = O36E35;
```

```
IF E30 = 2 THEN VSLITPOS = 1;
  ELSE VSLITPOS = 0;
IF E30 = 3 THEN SLITPOS = 1;
  ELSE SLITPOS = 0;
IF E30 = 4 THEN SOMEPOS = 1;
  ELSE SOMEPOS = 0;
IF E30 = 5 THEN FAIRPOS = 1;
  ELSE FAIRPOS = 0;
IF E30 = 6 THEN FGOODPOS = 1;
  ELSE FGOODPOS = 0;
IF E30 = 7 THEN GOODPOS = 1;
  ELSE GOODPOS = 0;
```

FILE: THESIS14 SAS A1

```
IF E30 = 8 THEN PROBABLE = 1;
  ELSE PROBABLE = 0;
IF E30 = 9 THEN VPROB = 1;
  ELSE VPROB = 0;
IF E30 = 10 THEN ALMSURE = 1;
  ELSE ALMSURE = 0;
IF E30 = 11 THEN CERTAIN = 1;
  ELSE CERTAIN = 0;

PROC LOGIST CT PROB = .575;
  MODEL YESNAV = WHITE CURTAGE MARSTAT DEPS FAMED HSGRAD SOMECOL
                 JUNIOR CHIEF FRSTERM SNDTERM;

PROC LOGIST CT PROB = .575;
  MODEL YESNAV = WHITE CURTAGE MARSTAT DEPS FAMED HSGRAD SOMECOL
                 JUNIOR CHIEF FRSTERM SNDTERM VSLITPOS SLITPOS
                 SOMEPOS FAIRPOS FGOODPOS GOODPOS PROBABLE VPROB
                 ALMSURE CERTAIN;

PROC LOGIST CT PPROB = .575;
  MODEL YESNAV = WHITE CURTAGE MARSTAT DEPS FAMED HSGRAD SOMECOL
                 JUNIOR CHIEF FRSTERM SNDTERM CIVJOB TOTLSAT
                 FAMINC VSLITPOS SLITPOS SOMEPOS FAIRPOS FGOODPOS
                 GOODPOS PROBABLE VPROB ALMSURE CERTAIN;

PROC LOGIST CT PPROB = .575;
  MODEL YESNAV = INTENTNS WHITE CURTAGE MARSTAT DEPS FAMED HSGRAD
                 SOMECOL JUNIOR CHIEF FRSTERM SNDTERM CIVJOB
                 TOTLSAT FAMINC;

PROC REG SIMPLE;
  MODEL INTENTNS = WHITE CURTAGE MARSTAT DEPS FAMED HSGRAD SOMECOL
                   JUNIOR CHIEF FRSTERM SNDTERM CIVJOB TOTLSAT FAMINC;

/*
//
```

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